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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/599,880	02/19/2007	Willibald Dafinger	WAS0813PUSA	5961
22045	7590	12/08/2008		
BROOKS KUSHMAN P.C. 1000 TOWN CENTER TWENTY-SECOND FLOOR SOUTHFIELD, MI 48075			EXAMINER	
			CUTLIF, YATE KAI RENE	
			ART UNIT	PAPER NUMBER
			1621	
			MAIL DATE	DELIVERY MODE
			12/08/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/599,880

Applicant(s)

DAFINGER ET AL.

Examiner

YATE' K. CUTLIFF

Art Unit

1621

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 August 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 6-16 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 6-16 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12 October 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-8508)
- Paper No(s)/Mail Date _____

- 4) ☐ Interview Summary (PTO-413)
- Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Status of Claims

1. Claims 6 -16 are pending.
Claims 1-5 have been canceled
Claims 6 - 16 are rejected.

Response to Amendment

2. The amendment to claim 1 and the inclusion of new claims 15 and 16, submitted August 22, 2008 is acknowledged and entered.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.
4. Claims 6, 12, 15 and 16 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
5. Claim 6 recites the limitation "the recycle gas" in line 11; and "the vinyl acetate-recycle gas" in line 12. There is insufficient antecedent basis for this limitation in the claim.
6. Claim 12 recites the limitation "the reactor" in 21. There is insufficient antecedent basis for this limitation in the claim.
7. Claim 15 is recites the limitation "purging the reactor" in line 1. There is insufficient antecedent basis for this limitation in the claim. Further, claim 15 is dependent upon a cancelled independent claim.

8. Claim 16 is rejected for depending upon a cancelled independent claim.

Response to Arguments

9. Applicant's arguments, see pages 7-14, filed August 22, 2008, with respect to the rejection(s) of claim(s) 6 - 14 under 35 U.S.C. 103(a) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Severs (US 3,855,280) in view of Williams (EP 0985657) in view of de Poitiers et al. (US 6,663,692) in view of Calcagno et al. (US 3,862,216) and further in view of Broz (US 3,904,656) as set out below.

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

12. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of

the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

13. Claims 6 – 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over in view of Severs (US 3,855,280) in view of Williams (EP 0985657) in view of de Poitiers et al. (US 6,663,692) in view of Calcagno et al. (US 3,862,216) and further in view of Broz (US 3,904,656).

14. The rejected claims cover, inter alia, a process for ethylene recovery in a recirculating gas process for preparing vinyl acetate. Independent claims 6, 12 and 13 include steps a) to f). Rejected claims 7 and 8 disclose uses for the ethylenic gas recovered from the process of claim 6. Rejected claims 9-11 further disclose the reaction conditions.

15. In claim 6, the reaction of step a) occurs in a reactor; and the product gas stream of step b) is fed from the reactor at system pressure directly to a recycle gas scrubber charged with acetate acid, and vinyl acetate is removed from the recycled gas.

16. The process of claim 12 does not include the use of a reactor; however, it sets out the composition of product gas stream after separation in step b). Rejected claim 14 sets out the content of the ethylene recycle stream after carbon dioxide removal.

17. The process of claim 13 does not include the use of a reactor; however, it sets out the composition of product gas stream after removal of carbon dioxide in step e).

18. Rejected claims 15 and 16 are dependant on cancelled claim 1; however, for the purposes of this rejection Examiner is going to presume the claims are intended to depend upon claim 6.

19. Severs discloses a process for preparing vinyl acetate from the reaction of ethylene, acetic acid and molecular oxygen in the presence of a catalyst. (see column 1, lines 11-14 & lines 38-50). The process of Severs discloses a product recovery system wherein a gaseous mixture of reaction products and unreacted reactants withdrawn from the reaction zone is separated into a crude product cut and a recycle fraction comprising unreacted feed stock, and the fraction being a gaseous mixture comprising largely ethylene. Further, included is a recycle purification system that removes the carbon dioxide and atmospheric gases before returning the recycle stream to the reaction zone; and where an important part of the recycle purification system included a scrubbing system. (see column 4, lines 32-44 & 50-52). Furthermore, it is stated that the vinyl acetate is removed from the gaseous product mixture by fraction separation into a liquid containing vinyl acetate, waste gases and a gas recycle stream. The gas obtained from the separator is scrubbed with water to recover any additional quantities of vinyl acetate. Also, the scrubbed gas stream from the scrubber, after withdrawal of a set fraction as a gas purge is comprised largely of ethylene that is recycled to the reaction system after being scrubbed with a carbon dioxide absorbing liquid. (see column 5, lines 53-68 & column 6, lines 1-11).

20. Williams et al. discloses a process for preparing vinyl acetate by reacting ethylene, acetic acid and oxygen in the presence of a Pd/Au support catalyst; and recovers unreacted ethylene gas from the vinyl acetate reaction process. The vinyl acetate reaction process is carried out above atmospheric pressure, (0.5 barg to 20 barg) and at temperatures ranging from 100°C to 400°C. (see page 2, lines 43 - 56, page 4, lines 43-44). Williams et al. operates at high ethylene concentrations and seeks to reduce the amounts of inerts in the recycle gas because it increases the loss of ethylene. However, the numerous methods for reducing/minimizing/eliminating inerts in the ethylene recycle is an indication that Williams et al. recognizes that there is a likelihood that inerts will consistently remain in the ethylene even after a treatment to remove carbon dioxide and inerts. The inerts of Williams et al. can be nitrogen, argon, methane, or ethane. Further, of the ten methods suggested by Williams et al. to reduce the carbon dioxide and other inert gases, one discloses the use of **off-gas prescrubber prior to the carbon dioxide removal system**. Williams et al. recovers the unreacted ethylene from the gases withdrawn from the reactor used for making the vinyl acetate, by membrane separation or chemical treatment. The chemical treatment process may comprise steps (i) separating the condensable products from the gases by condensation, (a') contacting the gases of step (i) with **acetic acid in a scrubber to remove residual vinyl acetate product**, (b') treating the product of step (a') with a water scrubber to remove acetic acid and (c') removing carbon dioxide from ethylene in the product of step (b') by using a Benfield system. (see page 4, paragraph [0028] - [0034]). The Benfield system is a carbon dioxide removal system that uses absorption.

Williams et al., in Figure 5 shows that selectivity of the process becomes increasingly selective toward the production of vinyl acetate as the concentration of ethylene is increased beyond 60%. Additionally, Williams et al., in Figure 3 shows that an increase in ethylene concentration decreases the rate of carbon dioxide production.

The Severs and Williams et al. references each disclose process for synthesis of vinyl acetate where the reaction is between ethylene, acetic acid and oxygen in the presence of a catalyst. Neither of the reactions has as their focus the recycle of ethylene product gas stream, however, each states that withdrawn gas product stream is comprised largely of ethylene. Each reference discloses the scrubbing of the product gas stream and removal of the carbon dioxide prior to recirculating it back into the vinyl acetate production process. The process of Severs and Williams et al. fail to disclose, as set out in claims 6, 12 and 13, that the product gas stream is fed at system pressure to the acetic acid charged scrubber.

However, de Poitiers et al. discloses a process to overcome problems associated with scrubbing the gaseous product mixture, of a vinyl acetate product process, with an aqueous scrubbate to remove the acetic acid from the gaseous fraction **prior** to carbon dioxide removal. In the process of de Poitiers et al. the gaseous product stream produced by the manufacturing of vinyl acetate are withdrawn from the reactor cooled to form a liquid fraction and a gaseous fraction, scrubbing the gaseous fraction in a scrubber containing water and acetic acid to remove the acetate ester (vinyl acetate). (see column 2, lines 14-19 & 56-67; & column 3, lines 1-4 & column 4, lines 29-36). de Poitiers et al. is silent with regard to the reuse of the recycled gas after

scrubbing, however, based on the teaching of Williams et al. it would be within the purview of one skilled in the art to recirculate the gas stream after vinyl acetate removal and carbon dioxide removal. A reference is good not only for what it teaches by direct anticipation but also for what one of ordinary skill in the art might reasonably infer from the teachings. (*In re Opprecht* 12 USPQ 2d 1235, 1236 (Fed Cir. 1989); *In re Bode* 193 USPQ 12 (CCPA) 1976).

Severs, Williams et al. and de Poitiers et al. fail to disclose any other use for the recovered ethylene obtained after scrubbing and removal of the carbon dioxide. For this reason Examiner joins Calcagno et al.

Calcagno et al. teaches a process for the production of vinyl acetate by catalytic oxidation of ethylene in the presence of acetic acid; where a fraction of the recycled gases are withdrawn from the reactor where the vinyl acetate is formed and the ethylene contained in the fraction is catalytically oxidized to acetic acid. (see column 1, lines 31-48). Calcagno et al., even though it is teaching a different process states that it is customary in the prior art to remove the by products from the recycle gases, which contain mostly ethylene, by known purification processes. (see column 1, lines 20-28). As such if the ethylene of the recycle gas is purified it becomes useful for any other industrial process that uses ethylene in their production process, such as the one set out in Broz where various ethylene glycols are produced.

The core step of Applicant's process as set out claims 6, 12 and 13 is step d), which state; "the product gas stream is fed at system pressure to a recycle gas scrubber charged with acetic acid to remove the vinyl acetate". This process step is a change in

the standard sequence according to the teachings of Severs which scrubs the gaseous fraction for the vinyl acetate process, but, the scrubbing is done in different process steps and with different scrubbate. However, Williams discloses that scrubbing can be done prior to carbon dioxide removal; and de Poitiers et al. teach a process for scrubbing the product gas stream, with an acetic acid scrubbate, before carbon dioxide removal. Applicant is reminded that, the selection of any order of performing process steps is prima facie obvious in the absence of new or unexpected results. (In re Burhans, 154 F.2d 690, 69 USPQ 330 (CCPA 1946)). Also, the selection of any order of mixing ingredients is prima facie obvious. (In re Gibson, 39 F.2d 975, 5 USPQ 230 (CCPA 1930)).

With regard to the weight percentage of the composition mixture of the product gas stream, Williams discloses that when the recovered ethylene is introduced into the reactor at the step for vinyl acetate production at least the composition is at least 60%. (see page 2, line 52).

Neither reference fully discloses each of the claimed weight percentages for the product gas stream after scrubbing, or after scrubbing and carbon dioxide removal. However, the prior art references of Severs and Williams et al. each disclose that the gaseous product mixture from the vinyl acetate production process contains largely unreacted ethylene, along with by-products such as, carbon dioxide, argon, nitrogen, oxygen, methane and/or ethane. Therefore, these weight percentages are deemed to be within the purview of an ordinary artisan; and are deemed to be obvious absent a showing of unexpected results.

It would have been obvious to one of ordinary skill in the art at the time of the claimed invention to scrub the product gas in a scrubber charged with acetic acid to remove vinyl acetate, prior to the removal of the carbon dioxide as suggested by Williams et al. and de Poitiers et al. as an alternative to the process taught by Severs. Further, it would have been obvious to recycle a portion of the scrubbed product gas into the vinyl acetate process and use another portion of the scrubbed product gas in a process to produce acetic acid as suggested by Calcagno et al. Furthermore, once the ethylene from the scrubbed product gas has been purified, it would have been within the purview of an ordinary artisan in the chemical manufacturing industry to use the ethylene in the production of other products such as ethylene glycol as taught in Broz. As disclosed in de Poitiers et al. the motivation for the combination of processes is to reduce ethylene waste.

Therefore, the invention as a whole was *prima facie* obvious because a person of ordinary skill in the art at the time the invention was made, would have been motivated to combine the prior art to achieve the claimed invention and that there would have been a reasonable expectation of success.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to YATE' K. CUTLIFF whose telephone number is (571)272-9067. The examiner can normally be reached on M-TH 8:30 a.m. - 5:00 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Daniel M. Sullivan can be reached on (571) 272 - 0779. The fax phone

number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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